

THE B&O MODELER

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RE-DETAILING AKANE'S B&O EM-1 EXCLUSIVE M-26B BOXCAR FROM COMPANY STORE

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Cover Photos – Top, Akane EM-1 – John Holt, Jr. photo. Bottom, Red Caboose M-26b – Mike Cather photo.

AN INVITATION TO JOIN THE B&O RAILROAD HISTORICAL SOCIETY

The Baltimore and Ohio Railroad Historical Society is an independent non-profit educational corporation. The Society's purpose is to foster interest, research, preservation, and the distribution of information concerning the B&O. Its membership is spread throughout the United States and numerous foreign countries, and its scope includes all facets of the B&O's history. Currently the Society has over 1600 registered members.

Members regularly receive a variety of publications offering news, comments, technical information, and in-depth coverage of the B&O and its related companies. Since 1979, the Society has published a quarterly magazine, *The Sentinel*, dedicated to the publication of articles and news items of historical significance. Other Society publications include monographs, calendars, equipment rosters, and reprints of original B&O source material. Their

purpose is to make otherwise unobtainable data available to the membership at reasonable cost.

Membership in the Society is a vote of support and makes all of the Society's work possible. It provides those interested in the B&O with a legitimate, respected voice in the railroad and historical communities. By working together, B&O fans are able to accomplish much more than by individual efforts. No matter how diverse your interests or how arcane your specialty, others share your fascination with America's most historic railroad. We invite your participation. Several classes of annual memberships are available, Regular memberships are only \$35.00. If you would like to join, visit the website, <http://borhs.org/Membership/Registration.htm> to fill out a membership application, print a copy and mail it to:

B&ORRHS
ATTN: Membership
P.O. Box 24068
Baltimore, MD 21227-0568

FROM THE EDITOR

What Next?

I got an email last night from a Society member suggesting a new type of article for *The B&O Modeler*. It was the best kind of suggestion, as it came with an offer to help accomplish the suggestion. There are a lot of things that we could do as a

modeling magazine and as a Historical Society, as we have many opportunities right now. The problem is we don't have too many people to help do them. Maybe that's one of the things the few folks volunteering should work on, getting more help and

planning for the future if it does not include more volunteers, but less.

I recently asked readers for a little more help with this magazine and I got it. Three or four folks stepped forward and said, "What can I do to help?" Thanks

guys; we will be seeing your efforts in coming issues. So maybe it's as easy as asking. Let's see if it works for the Historical Society. In a about a month we will be looking for volunteers to serve on the Board of Directors, can anyone help? If you can, send me an email.

FROM THE COMPANY STORE

CRAIG CLOSE, COMPANY STORE MANAGER

What's New!

The M-26b Time-Saver boxcars by Red Caboose are now in stock. These HO models are Ready-To-Run and come as oxide red with side sill patches. The three different road numbers are exclusive to the Society's Company Store. These models were developed with close association between Red Caboose and knowledgeable B&O modelers, but the Society is not the creator of the product. They are priced at \$35 with a 10% member discount. The advance order offer in the *Short Blasts* newsletter is no longer in effect. The kits presented in that offer sold out quickly.

Item 33152 Road No 267018

Item 33153 Road No 267088

Item 33154 Road No 267884

Another model which is expected to be carried this summer is an HO scale M-53 boxcar kit to be produced by WrihTrak. Again there is close association between the producer and knowledgeable B&O modelers. This kit will be resin with a precision one-piece body, much easier than previous resin kits with flat sides or roughly finished one-piece body castings. It will contain trucks and decals but without couplers. It will be most similar in quality, fit, and finish to the very popular flatcar kits sold last year, but this kit does include trucks which are about \$6.00. A limited run will be available from the Store. Keep an eye out for an official announcement here in *The B&O Modeler*, in the *Short Blasts*, and on the B&O Yahoo Group.



Mike Cather Photograph



B&ORRHS Collection

LAYOUT PHOTOS



William Hanley Photograph

RE-DETAILING AKANE'S HO B&O EM-1

BY LARRY ELLIOTT AND JOHN HOLT, SR.

PHOTOS BY LARRY ELLIOTT, UNLESS OTHERWISE SPECIFIED.



B&O EM-1 #7605 with westbound empties on Newburg grade on John Holt, Sr. layout - Photo by John Holt, Jr.

Introduction

Some background on this project will be helpful in order to understand how this project started. Over a period of several years, John acquired three Akane B&O EM-1 steam engines. The engines were not new but retained all of the original equipment components. This included crude assembly and brass turnings. The original engines did have one outstanding characteristic. They ran very well and would practically pull anything. Most likely their biggest benefit is they are still reasonably priced in today's market when compared to recent models of the same engine by other manufactures.

Over time, John developed the idea that the engines would be vastly improved if they could be re-detailed using currently available detail parts to replace the turnings. With the advent of DCC and sound, he also wanted the models' open frame motors replaced, due to their high current draw, and the engines to be sound equipped.

John started his research by reviewing books, magazines, historical reference materials etc. to develop a list of materials that would be needed to re-detail three engines. This in itself required several

years with a lot of trips to hobby shops and train shows to acquire the necessary parts.

Although John is an outstanding modeler, he did not feel experienced enough to re-detail a brass engine because he lacked some of the needed skills, such as soldering and airbrushing. Therefore, he solicited the aid of Jim Brewer to handle all of the major painting and asked me to handle all of the detail and decoder installation work on this project.

A project of this scope is within the skill range of any modeler who has been modeling for some time. It is definitely not a project a beginner would want to attempt the first time out. It does require some basic soldering skills and proper use of various power tools available like a drill press and Dremel motor tool. The hand tools are the same tools used for other modeling tasks, including various files, hobby knives, screw drivers, scale rules etc.

Historical Background

William (Bill) A. Barringer, a B&O Historical Society member, published an article in the January-February, 1981 issue of *Mainline Modeler* on the B&O EM-1. It provides an excellent historical

overview of the engine as well as many close-up pictures. The following is an excerpt from that

article. (Used with Bill Barringer's permission)



EM-1 No. 7602 Baldwin Builder's Photo – Bill Barringer Collection



EM-1 No. 7629 Baldwin Builder's Photo – Bill Barringer Collection

Beginning in February 1944, Baldwin delivered 30 modern 2-8-8-4's to the B&O. They were what would be called "state of the art" locomotives, employing all current modern appliances and design features. The EM-1 class 2-8-8-4's weighed in at 628,700 lbs, and developed 115,000 lbs of tractive effort. Steam pressure was 235 pounds. Cylinders were 24" x 32", cast integrally with the frames. Sixty four inch box pok drivers were provided and all engines and tender axles equipped with roller bearings. Engine bed lubrication, front end throttle, Worthington feedwater heater, and a standard type HT-M stoker completed the picture. The all welded tender held 22,000 gallons of water and 25 tons of coal. It was carried on long wheelbase Buckeye trucks, equipped with 36" wheels. Although B&O diagrams omit reference to it, all were equipped with train heat lines, which permitted use in passenger service. It is a tribute to the EM-1's that the B&O never saw the need to tinker with them during their 15 odd years of service. Minor piping changes and the addition of overfire jets seem to be the only modifications. There were, however, minor differences in the locomotives as built.

The first group, 7600 through 7609 had two fillers for each sandbox, located on the box's transverse center line. A large rectangular cover concealed the sanding

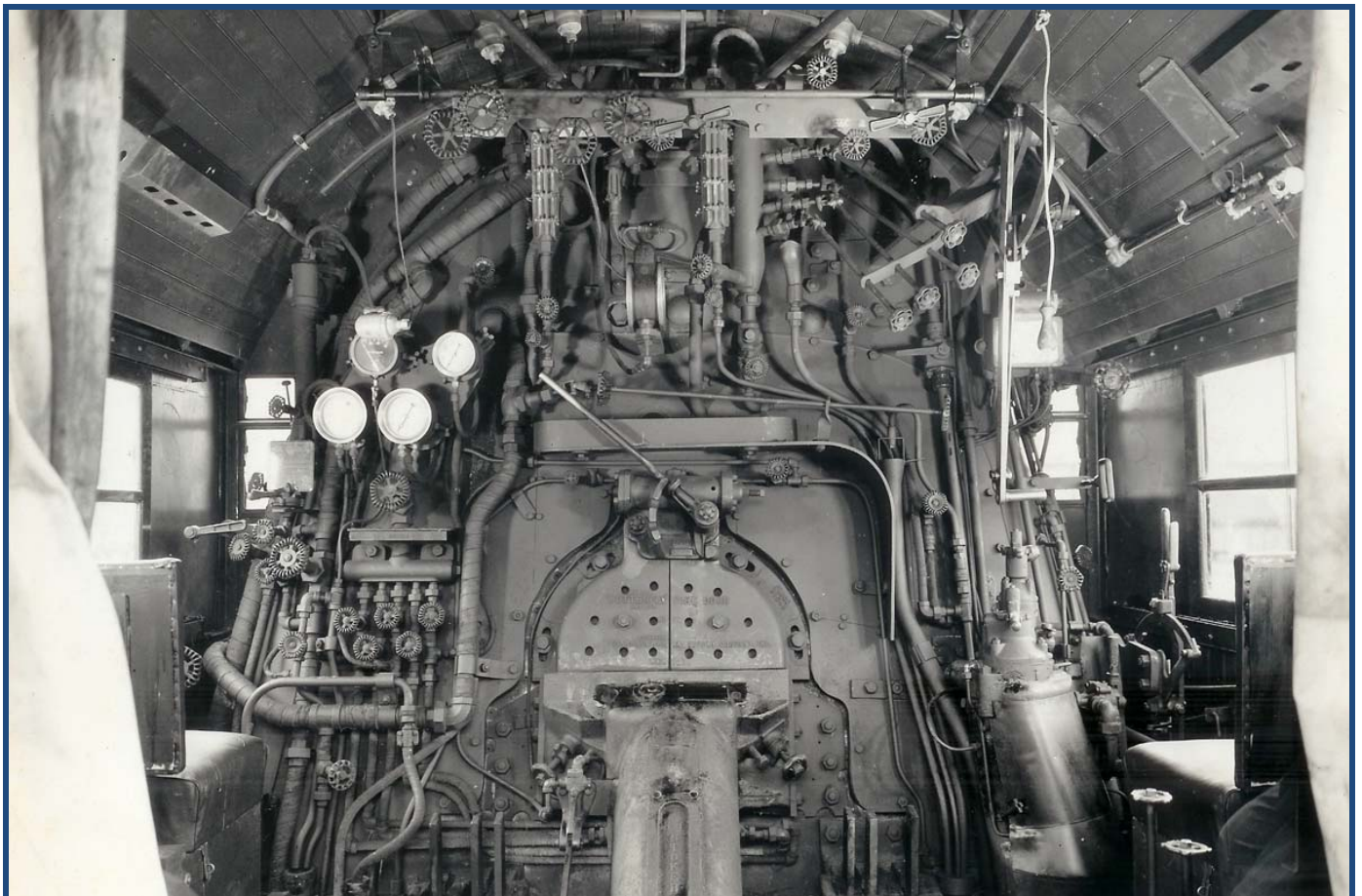
valves for the front sand box, while those for the rear were concealed by the boiler jacketing. Beginning with 7610, the sand fillers were relocated from the transverse to the longitudinal center-line with the sandbox. Sanding valve covers were as before. With the 7620, the large sanding valve cover was discarded, giving the locomotives a leaner look. The B&O's EM-1 fleet saw changes over their years of service as they were shopped, serviced, and sent back on the road. Some details about these are in the *Sentinel*, second quarter 2009, by Greg Smith.



EM-1 No 7602 Baldwin Builder's Photo – Bill Barringer Collection



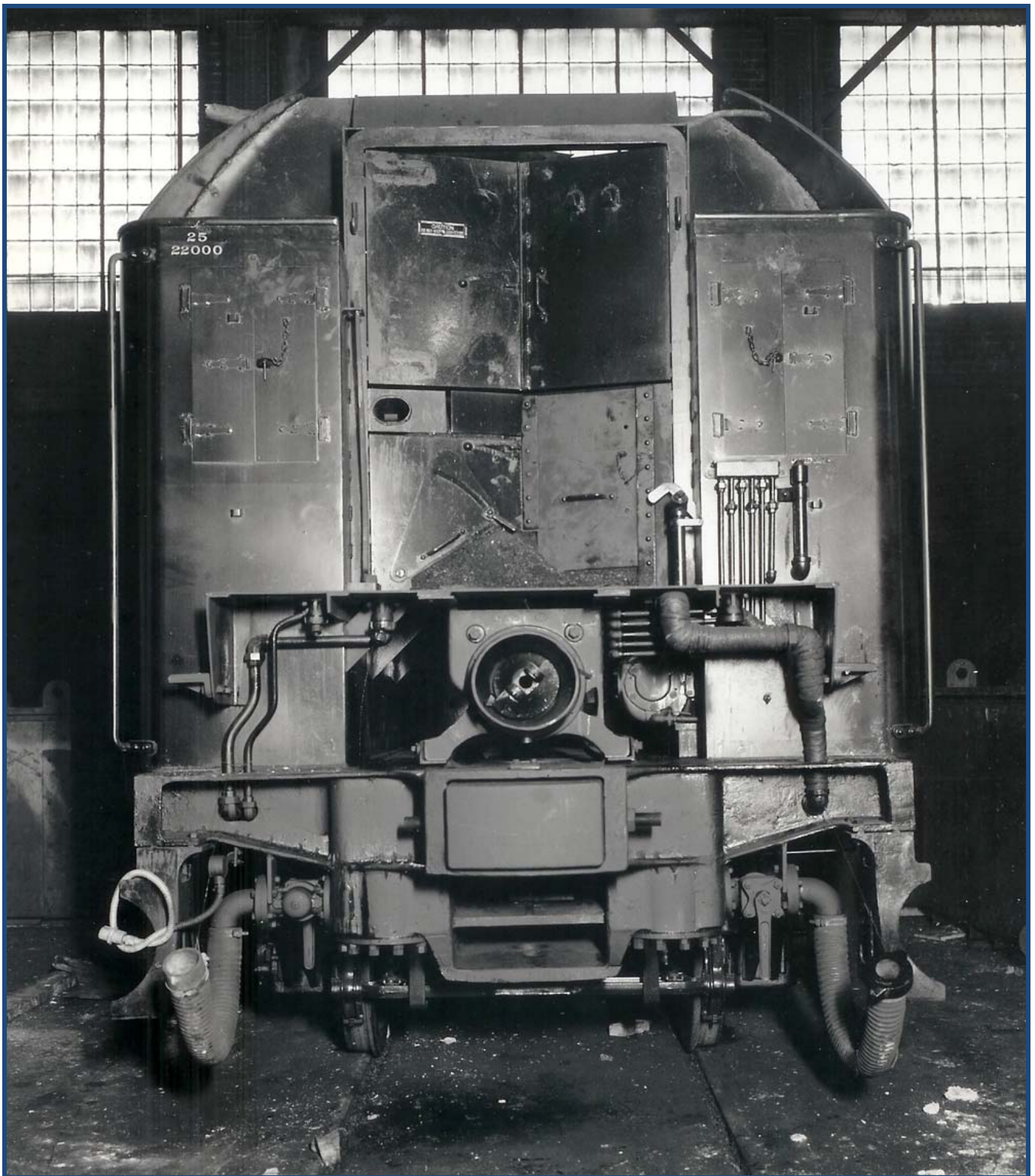
EM-1 No 7628 Baldwin Builder's Photo – Bill Barringer Collection



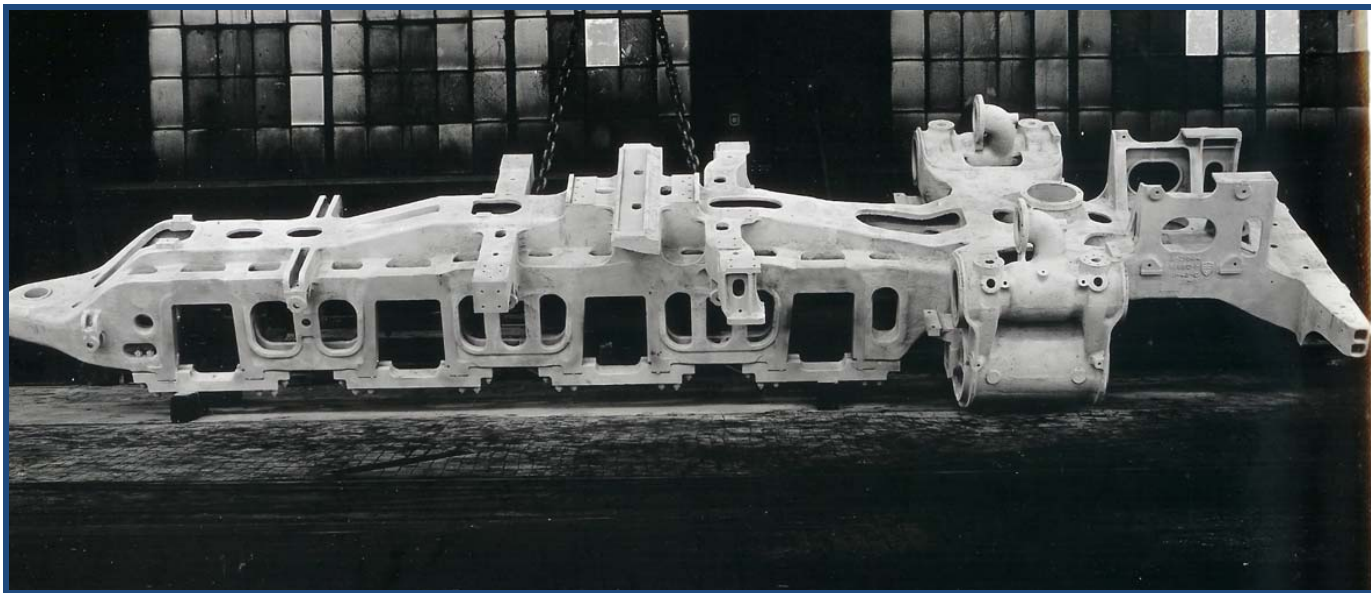
EM-1 Cab Photo showing unique mechanical whistle pull, Bill Barringer Collection



Rear of tender – Bill Barringer Collection



Front of tender – Bill Barringer Collection



EM-1 Front Cast Engine Bed – Baldwin Photo – Bill Barringer Collection



EM-1 Rear Cast Engine Bed – Baldwin Photo – Bill Barringer Collection

The Akane Model

While crude by today's standards, the model was "state of the art" for the time period in which it was offered. Generally, the model seems to follow the first group of engines, 7600 to 7609. There are some discrepancies in the Akane model when compared to the actual plans of the EM-1 which were a part of Mr. Barringer's article. The wheelbase on the original tender trucks is incorrect and the tender's overall length is a bit short while also sitting low compared to the plan. The locomotive itself is generally in line with the drawing. These issues are considered minor and do not detract from an otherwise reasonably priced model in today's market. The re-detailing work brings this model up-to-date and makes it an excellent addition to any B&O modeler's locomotive fleet.

The Re-detailing Work

John set up certain ground rules for the project. The original brass turnings were to be replaced with new brass castings. Special effort was to be given to replicating the EM-1's unique mechanical whistle linkage. No major rebuilding work was to be done to the engines. The engine's drive train was to remain original. A new can type motor and universal drive would be installed. This would replace the open frame motor and rubber tubing connecting the drive shafts. Ultimately, they were to be wired for DCC and sound equipped.

Depending on which production run, your EM-1 comes from will determine how the engine comes apart. All of these engines were from an early production run, therefore the boiler had a flat bottom from the smoke box to the cab. This is a piece of

sheet brass soldered to the smoke box front casting and held to the boiler with eight metric screws, four on each side. In some cases, the cab end of the sheet brass was also soldered to the front of the fire box. The engine factory weight is attached to this piece of sheet brass with nuts. The large piping from the rear engine to the smoke box is also attached to the brass sheet with screws. The first order of business, after removal of the drive train, is to remove this brass sheet, boiler front, weight and large piping. This opens up the boiler for future work as all newly installed cast parts will be soldered from inside the boiler.

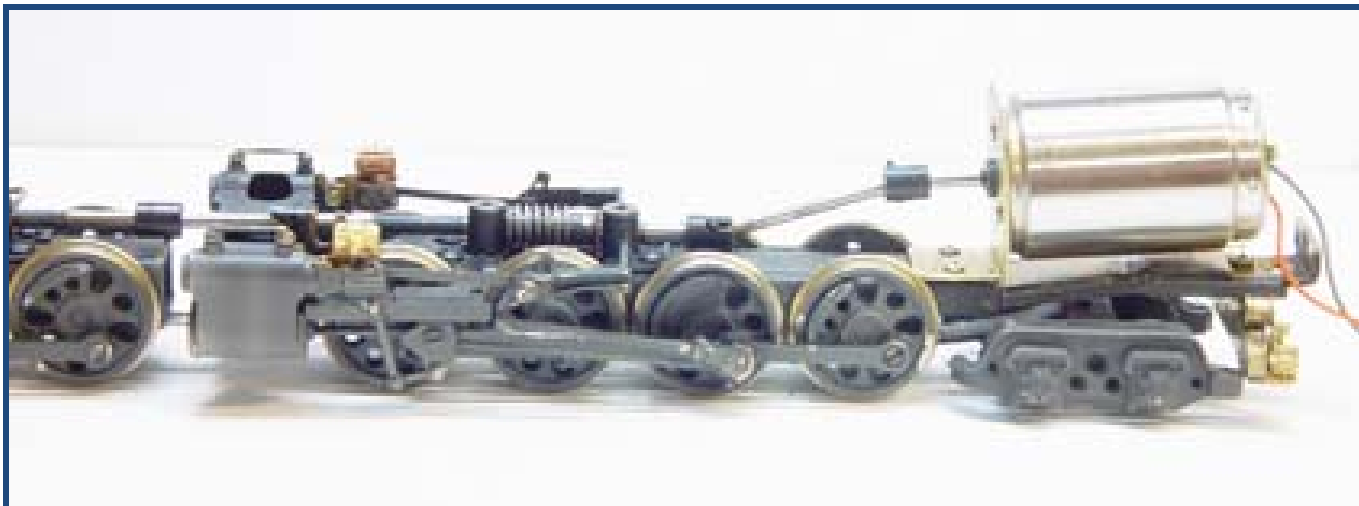
While the engines themselves were worked on one at a time, initially, all of the heavy work on the engines and tenders was accomplished first. This involved removing the original motors and fabricating new mounting brackets for the new can motors. The mounting brackets for the new motors were fabricated to use the original mounting holes and screws used to hold the rear frame extension. The rubber tubing was replaced with NWSL universal joints between the motor and rear engine and between the front and rear engine.



View of new motor with new mounting bracket



Top view of new motor and NWSL universal drive components



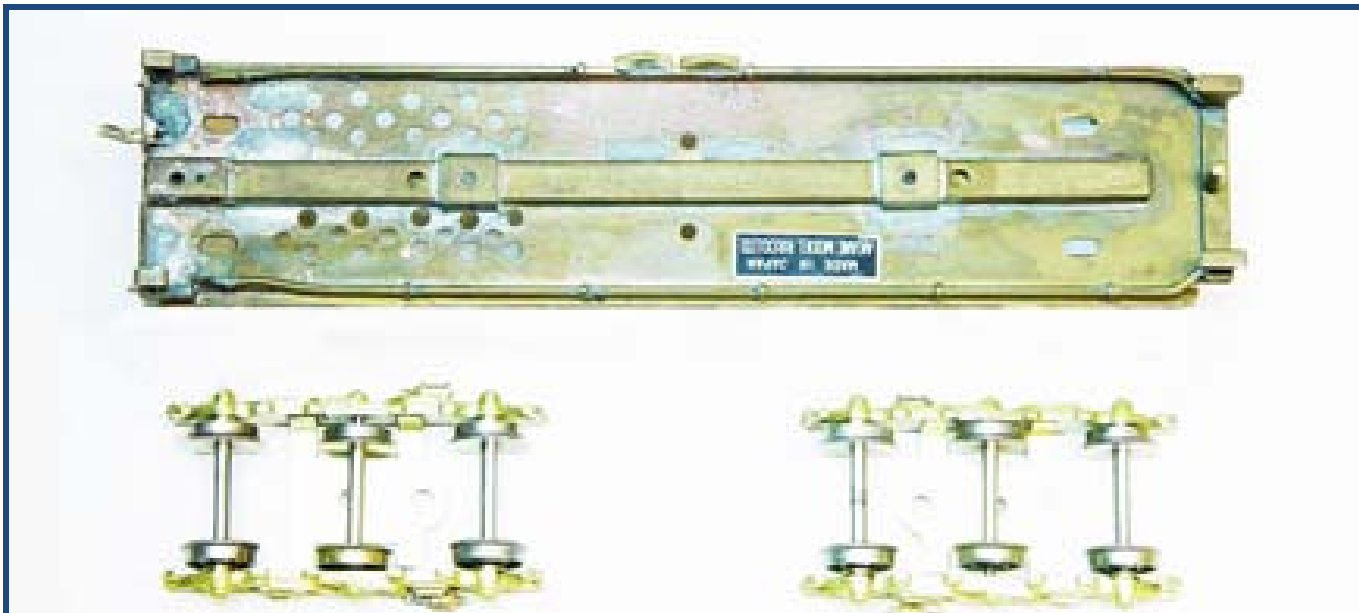
Side view of new motor and NWSL universal drive components

After disassembly, the tender floors were drilled for installation of the future speaker. This is a rather simple process, requiring having the speaker to be used to determine its mounting position and the location of the holes to be drilled. The holes will straddle both sides of the center sill. Care is needed in determining the exact location to avoid the internal braces inside the tender body used to hold the body to the floor.

The underside required the most work. New mounting holes needed to be drilled to accommodate the new longer tender trucks. This requires relocating the original bolster mounting pads. Since the new trucks were longer, the piping on the bottom of the tender has to be re-shaped to provide proper

clearance for the new trucks. It was necessary to use a little modeler's license when deciding on the location of the truck's mounting holes due to the short length of the model's tender body. Therefore, the trucks were spaced equally from each end, which is not the case on the prototype.

If the model's original trucks are replaced, the brake cylinders on the new trucks need to be removed and relocated. Since the new trucks need to be mounted in reverse due to their mounting holes, the brake cylinder casting would be on the incorrect end of the trucks. They need to be mounted towards the end of the trucks facing the middle of the tender body. (See picture below)



View of tender floor showing speaker; new truck mounting holes and brake cylinder placement on truck.

With the heavy work completed on all three engines, it was time to begin the re-detailing work, one engine at a time. The work was started at the pilot and progressed to the cab. With the boiler disassembled and the pilot removed from the drive train, we started work on the front end, pilot and boiler. This involves removing the brass wires used for the air and signal lines and the headlight from the pilot; and from the boiler front, removal of the classification lights, the crude hot water pump and associated piping including the bell but not its bracket.

From the top of the boiler, remove the stamped rectangular box for the water heater. The new Worthington hot water heater casting is installed in the hole created by the old stamped part but the hole does require some minor filing for the new casting to fit. On the boiler front, the new hot water pump requires drilling a new mounting hole. Some care

needs to be used in its placement so the existing hole is covered and the new casting will not interfere with the pilot. The long pipe on the casting needs to be bent at a 90 degree angle so it can be located under the running board on the engineer's side. Before soldering the casting, carefully measure where the bend is to occur and bend the pipe. The end of the pipe will need to be filed so it appears to have a 90 degree bend in it where it would enter the boiler. After you are sure of the fit, solder the casting to the boiler front. The new classification lights go back in the original holes. A hole has to be drilled in the center of the boiler front to accommodate the B&O emblem.

The picture shows all of the new castings installed on the pilot, boiler front and top of boiler. The 90 degree bend in the hot water pump piping is visible on the engineer's side of the engine.



Front ¾ view showing all of the newly installed castings

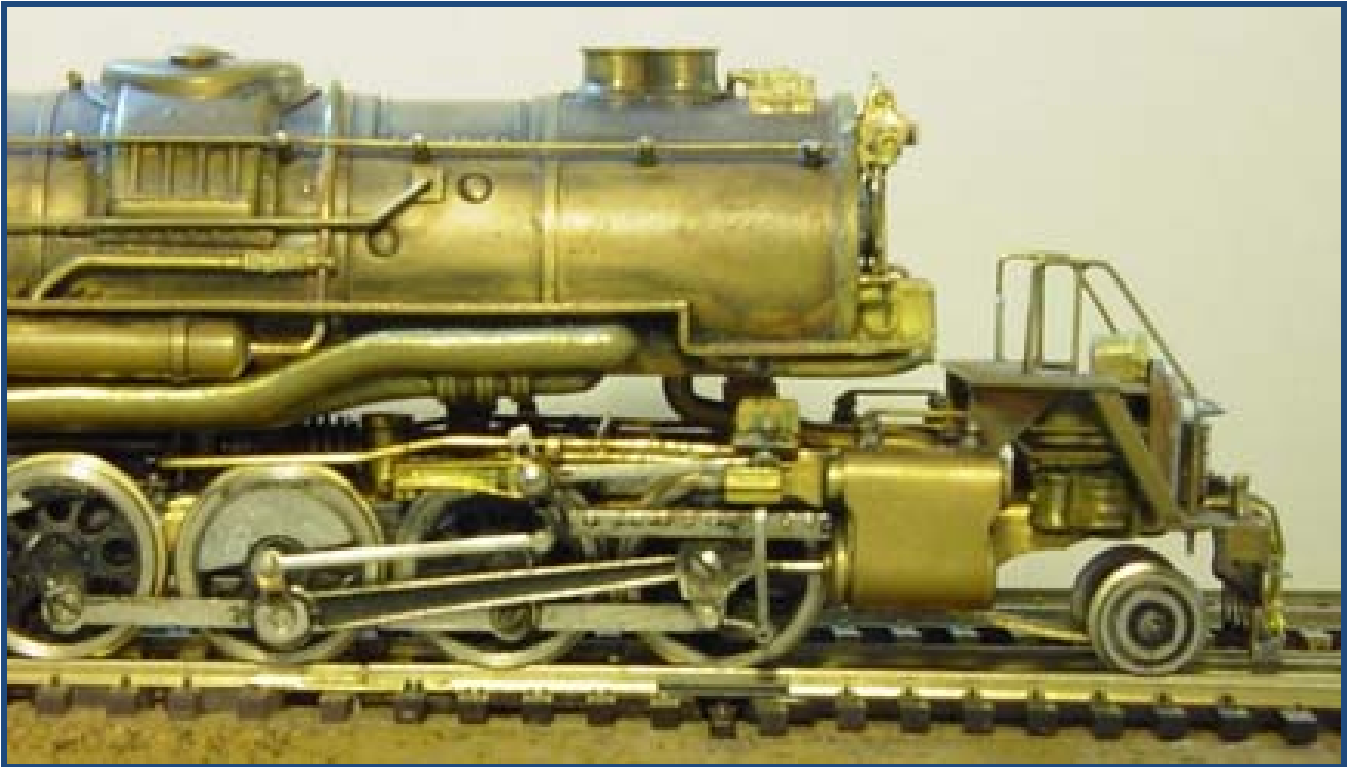
With this work complete, it was time to remove the brass turnings for the boiler check valves and their

associated piping. Reviewing various pictures of the prototype showed these original parts were not

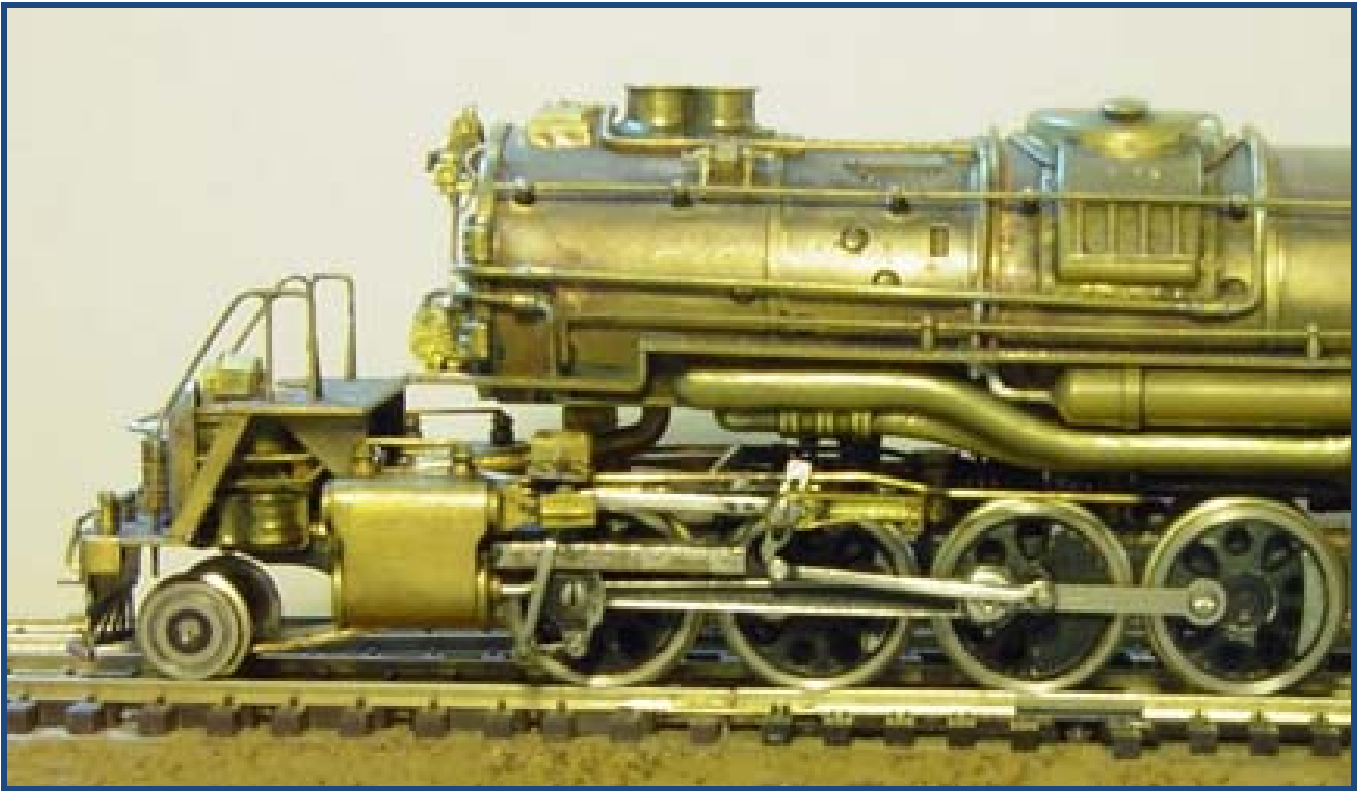
properly located. Therefore, the new brass check valve castings and associated new piping had to be adjusted accordingly. After the first engine, it was determined to be easier to just fabricate new piping from new brass wire rather than use the original piping. It makes for neater work and no splicing of small brass rod. Since you are already doing a re-piping, this is the time to complete the installation of the new piping for the hot water pump and the Worthington feedwater heater. Prototype pictures are an excellent aid in determining the location. Like all brass models of this time period, the new piping stopped at the running boards. No attempt was made to run the new pipes under the boiler. The reason for this becomes apparent later when you find out there is very little room between the boiler and the drive train.

On the fireman's side of the boiler, just under the smoke stacks is a part that initially made no sense. We found out that it was to represent an air valve for blower-smoke control. It took awhile but a casting was found that represents this part. Save this part since it is very fragile and therefore will be the last part installed before the boiler is put back together.

We now reach the cab end of the boiler. Here we remove the turning for the generator and distribution valve. The original model builders had an interesting way of attaching the parts. The generator was screwed to its mounting plate then the assembly was soldered to the boiler from the inside. The distribution valve was screwed to the steam turret cover before the cover was soldered to the boiler.



Engineer's side showing new piping



Fireman's side showing new piping. The blower-smoke air valve is shown next to the smoke stacks

Installing the new generator and distribution valve castings is a bit of a challenge. Please keep in mind; you want to do all of the soldering from inside the boiler. The original mounting pad for the generator will be used. This requires drilling a hole in the bottom of the new casting to solder in a piece of brass wire, approximately .020" diameter. At this point, the wire length can be one to two inches long as it must go through the mounting pad and the boiler shell. Determine exactly where the hole in the mounting pad is to be drilled and drill the new hole all the way through to the inside of the boiler. The old mounting screw cannot be removed so it must be cut flush with the top of the mounting bracket. It is then an easy task to push the wire on the generator casting through

the new hole and solder the wire inside the boiler before cutting off the excess wire.

The distribution valve is next. It requires similar work including making a mounting pad. The pad was fabricated from a piece of 1/4" angle brass, drilled before cutting it off. Referring to prototype pictures shows this part is a bit forward of the steam turret cover and just a little below. Again, determine where the hole in the boiler will be drilled. Repeat the process, push the wire in the casting through the hole in the mounting bracket and then through the new hole in the boiler. Solder the wire from the inside and cut off the excess. When properly installed the old hole in the steam turret will be hidden by the new casting.



Shows new generator installation



Shows new distribution valve installation

It is appropriate to point out that on the fireman's side of the engine, there is piping running along the top of the running board. Reviewing many prototype pictures seems to indicate that this piping belongs under the running board. While it can certainly be relocated such relocation is not recommended. The running boards have a diamond tread etched in them and removal of the pipe brackets will leave excess solder filling the etched tread which would be difficult to remove without ruining the etched running board.

We now move to installation of the cold water pump and the Nathan injector under the cab. The rear frame extension will need to be removed from the frame. It has a heavy cross piece of brass to which is soldered the engine brake cylinders. Remove this piece as well as the brake cylinders. The cylinders are located

incorrectly and need to be re-soldered to the top of the heavy brass piece facing forward near the top of the angle. A pad is required to hold the new cold water pump. It is cut from a piece of flat brass and will be approximately two times as long as the end of the pump. Before cutting, drill a mounting hole in the piece the size of the cast pin on the pump. Solder the pump to the piece of flat brass with the pump facing outward and towards one end. The other end of the flat brass will be soldered to the bottom of the heavy brass frame piece.



Shows new cold water pump and relocated piping

The heavy brass piece is now reattached to the frame extension and the frame extension is temporarily attached to the locomotive cab. This permits the original piping to be re-bent to match the connections on the newly installed pump. **DO NOT SOLDER** the re-bent piping to the pump as the frame extension has to be removed for re-installation on the frame. Remember, this extension holds the motor.

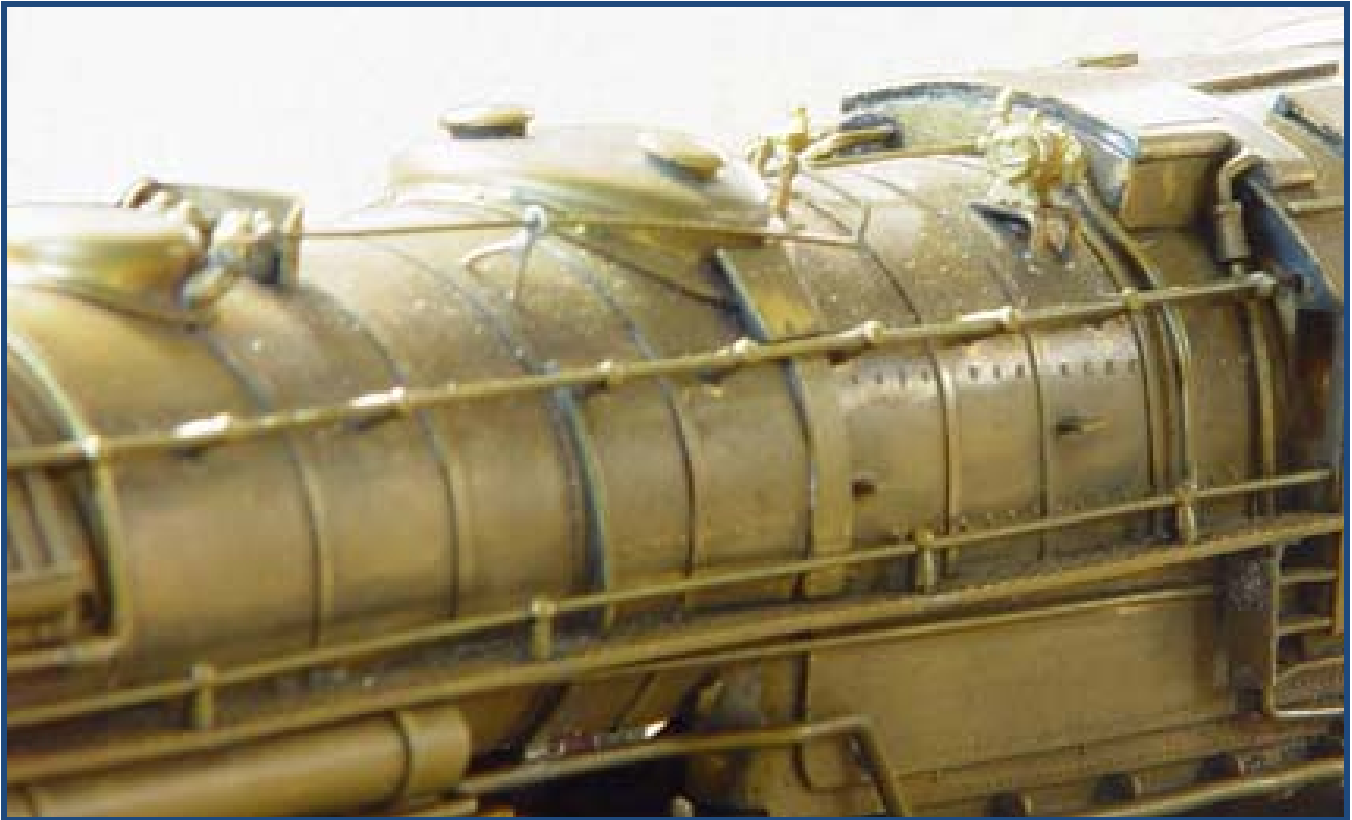
Proceeding to the engineer's side, we work on the Nathan injector. Its installation is a bit unique from the normal location of injectors. Instead of being mounted in line and under the engineer's seat, it is mounted 90 degrees to the locomotive's centerline and under the bottom of the cab just behind the heavy brass piece holding the brake cylinders and cold water pump. The two pipes on the casting are bent accordingly and require fabricating two brass tube unions to attach the injector to the existing pipes on the engineer's side of the engine. These unions are made from small tubing approximately 3/32" to 1/8" long.



Shows the new injector installed under cab

At this point, the old power reverse is removed and the new casting is installed in the same location. Now that all of the detail parts have been installed, it is time to determine how best to fabricate the EM-1's unique mechanical whistle linkage. No castings or parts exist for this process. After doing three engines, it was determined it could be fabricated easily using just two pieces of brass wire, two handrail stanchions and some brass "eye" pins. I believe the brass "eye" pins are ship modeler's parts. Again, reviewing the prototype photos show how the prototype linkage

was attached to the boiler. It now becomes a cut and fit exercise determining where to drill the holes in the boiler and for installation. The "eye" pins are used to fabricate the rod support that is half-way between the whistle and the rear sand dome. The handrail stanchions are used to hold the cross support rod just behind the rear sand dome. Viewing prototype photographs of the cab interior and backhead revealed how this unusual arrangement actually worked.

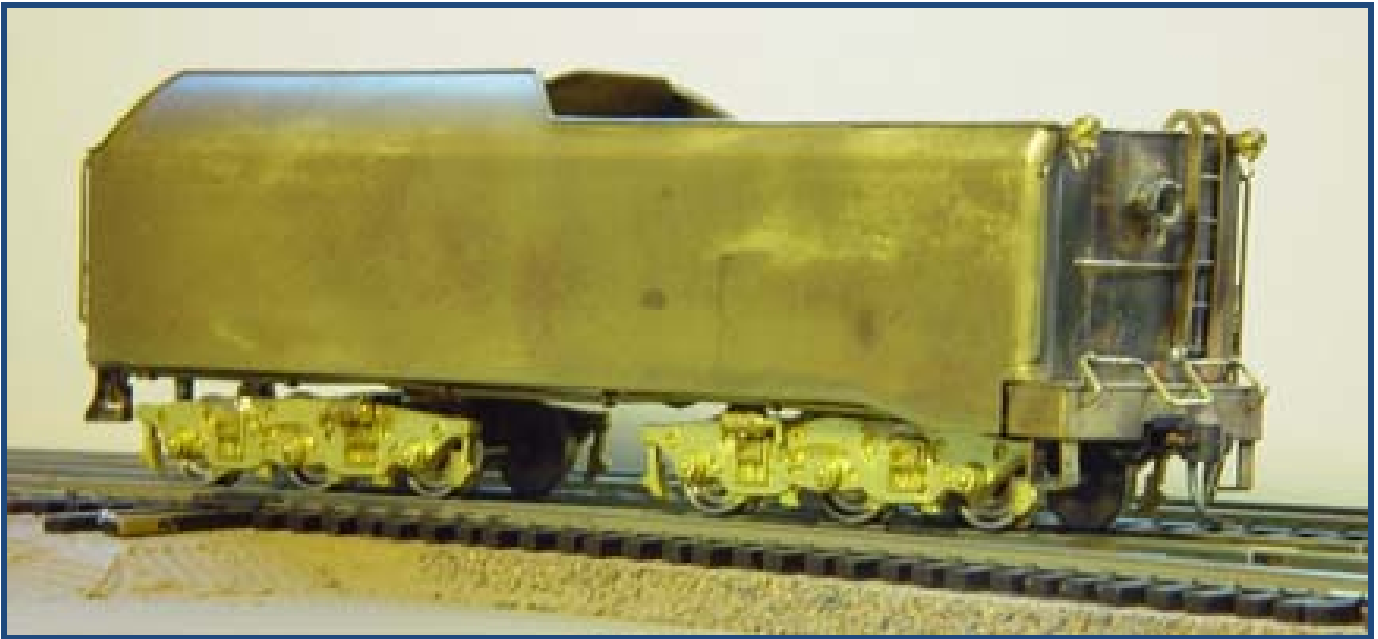


View showing completed whistle mechanical linkage. The middle and rear rod supports are also shown

Now is the time to solder the last casting to the boiler. The air valve for blower-smoke control is now soldered to the boiler in the existing hole just under the smoke stacks. There are two optional parts that could be installed. The model has brass stampings to represent the cleanout/washout plugs and front end throttle. These can be replaced with new castings noted as optional in the parts list. This completes the re-detailing work on the boiler and its re-assembly can begin. Start by cleaning the piece of flat brass that makes the bottom of the boiler of all excess solder and clean the large piping of all excess casting lines, so the piping looks smooth and crisp. Once completed, re-install in the boiler with the eight

metric screws. Now reattach the large piping to the bottom with its associated screws. The boiler is now completed and it's time to finish the tender body.

This is the easiest part of the work. It requires removal of the old classification lights, relocation of the ladder to the other side of the tender, installing the air and signal lines and mounting the new backup light casting. On the tender floor, new re-rail appliances will be soldered to replace the rather large and oversize ones on the model. On the prototype, these appliances were mounted on the outside frame edge about the middle of the tender body and not on the center sill as originally done on the model.



Fireman's side of tender showing new detail parts on rear



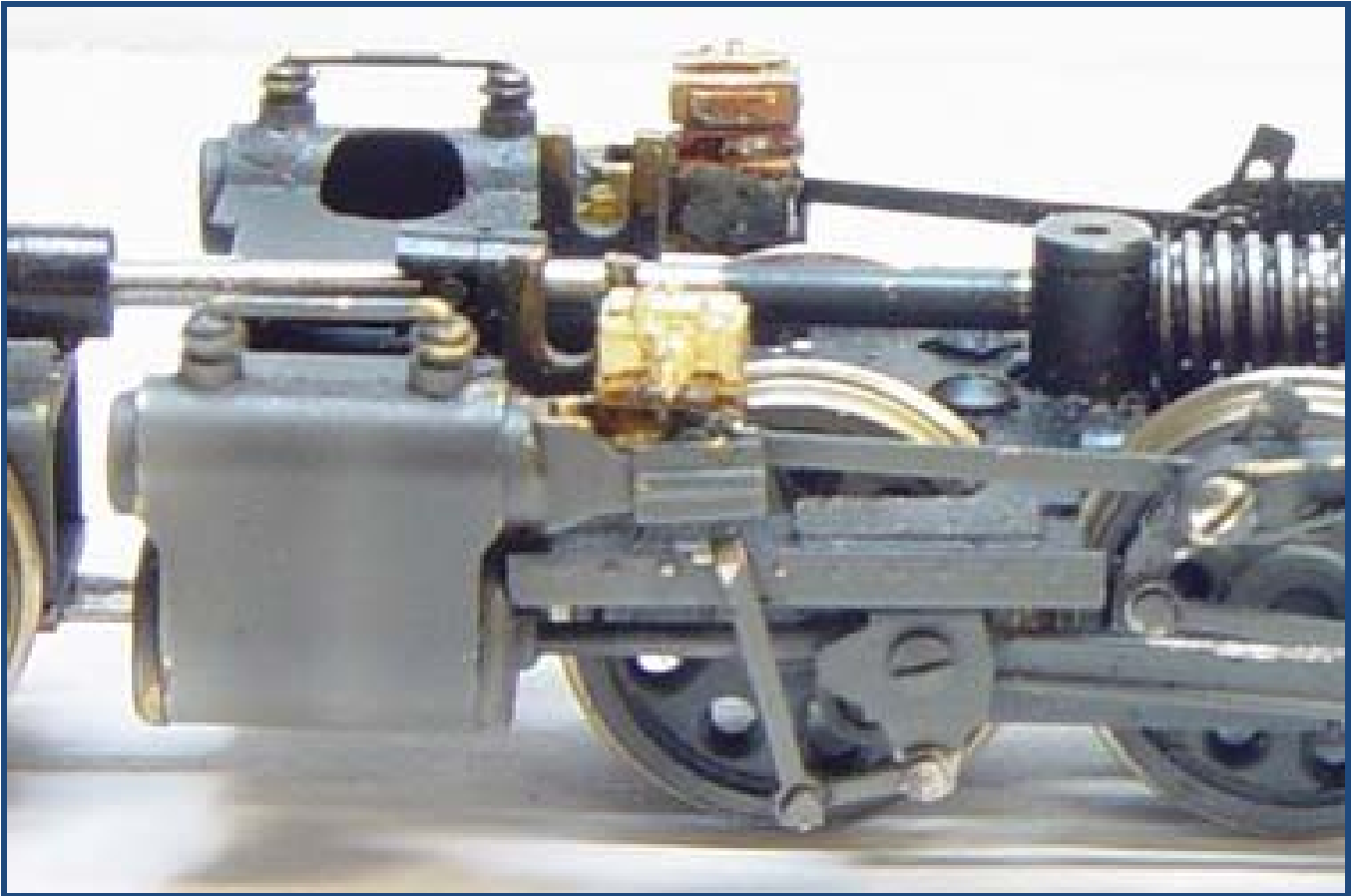
Engineer's side of tender showing new re-rail appliances

If there is a difficult part to adding new detail parts to the tender, it involves the mounting of the new backup light. The backup light casting needs to be drilled the diameter of the light to be used. A piece of brass tubing, sized to fit the hole drilled in the casting, is soldered to the back of the light casting. The brass tube is then cut to a length of approximately one inch. The tender body, besides being short, is also low in overall height. This requires reviewing the prototype pictures to determine a good mounting place on the back of the tender. Once the location is determined, drill a hole the size of the outside diameter of the brass tube and mount the backup light, soldering the light assembly

from the inside. The tube not only serves as a means of mounting the assembly but also a way to hold the future light bulb in line with the casting. There are optional parts that could be installed. The tender does not have a complete brake system. This can be corrected by using complete tender brake system from Cal-Scale. This complete system provides the air reservoir and triple valve since the brake cylinders are already on the trucks. You would need to refer to prototype pictures for proper placement or install these parts on the centerline of the tender so they clear the trucks. This completes the detail work on the tender and re-assembly can begin.

We now move back to the drive train. There are four final parts left to be installed and will, in a way, try your patience. They are the mechanical lubricators. Whether they come with a mounting bracket or not will be determined by the manufacturer you choose. Cal-Scale has the bracket, the others do not. If you use the Cal-Scale parts, you will need to completely disassemble the drives to get easy access to the steam chests. The proper bracket is mounted to the back of the steam chest on the inside, around the upper valve head. The easier method, so to speak, is to use brass angle stock. You will have to make new brackets out

of 3/16" or 1/4" brass angle stock. This requires drilling a hole in one side, soldering the lubricator to the angle and then cutting the angle stock so all excess angle stock is removed and hardly visible. You need to do this four times. Now you will begin to understand the meaning of patience. These assemblies need to be soldered to the back of the upper valve guide brackets on the inside. They need to be high enough to clear the valve linkage but low enough to clear the boiler shell. After this work is finished, all of the re-detail work on the locomotive is finished.



View showing the newly installed lubricators. Front engine is the same.

The drive train is re-assembled, motor re-mounted and pilot re-attached. A plated brass drawbar is used to connect the front and rear engine drives together. Originally, this bar was allowed to swivel on both mounting screws. With the original rubber tubing connection between the gear boxes, the front engine tracked reasonably well and stayed under the boiler on straight track. With the installation of the NWSL universal connections, an adjustment has to be made in the mounting method. This permits the front engine to properly track under the boiler on straight track. When re-installing the plated brass drawbar to

the front engine use a non-shouldered screw to attach the drawbar tight and centered on the frame. The original screw was a shouldered screw which permitted the drawbar to move freely. Attach the drawbar to the rear engine using the original shouldered screw as this is the new swivel point.

At this point, the boiler can be re-attached to the drive train. During the re-assembly of the locomotives, arrangements were made to install the future DCC sound decoders, thus all of the associated wiring was installed. This allows the engines to be

cleaned, primed, painted, detailed and decaled including weathering and clear coating.

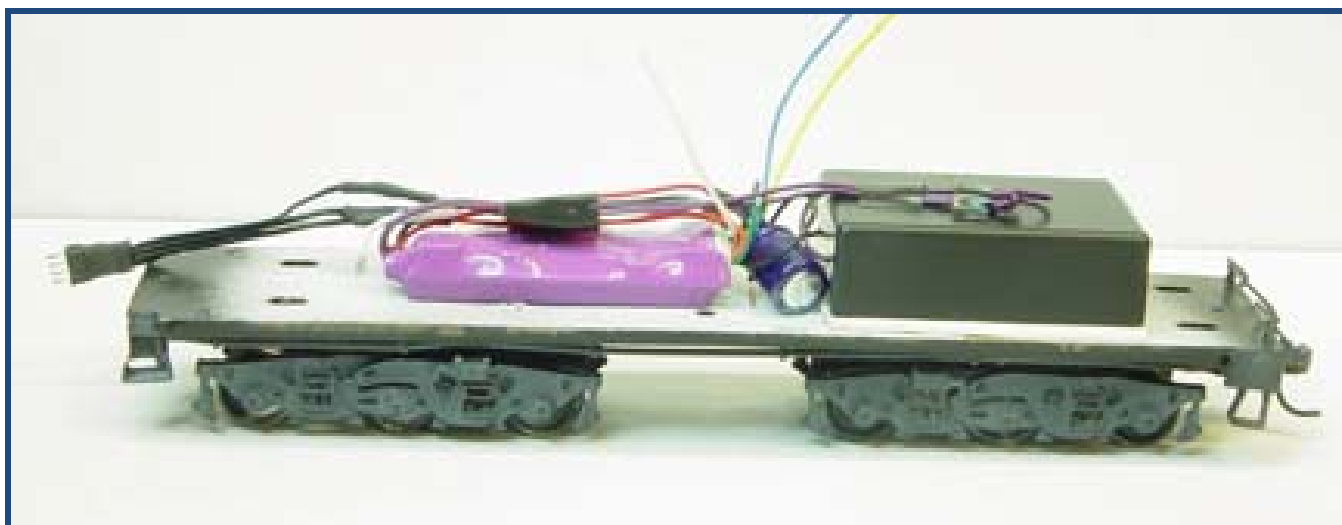
After this work is completed, it is then an easy matter to complete the DCC sound installation during re-assembly of the now completed model and perform the programming using JMRI's DecoderPro software.



The first completely re-detailed B&O EM-1, to be numbered 7603. Picture was taken on author's railroad.

At this point, the fun really begins with installation of the Tsunami Sound System. We are reaching the end of track, so to speak, where we can make the B&O EM-1 come alive. Actual installation follows standard industry practice for installing and wiring the various components. Proper installation and wiring techniques have been discussed in detail in all of the nationally published model magazines. Information is also available on the Internet from the

various manufactures of DCC equipment. Thusly, these details will not be covered again in this article. A reminder, just like any other modeling technique, the installation of a standard DCC decoder or one of the newer DCC sound system decoders requires patience on the part of the modeler. It is all in the planning and performing neat work. The finished model will be one that operates, sounds great and one in which the modeler can take pride.



This photo shows the completed installation of the Tsunami sound and speaker on the tender frame. Note the components are clear of the body mounting holes. The 3 unattached wires are for the headlight and backup light.

The following are pictures of the EM-1 No. 7605 operating on the author's railroad hauling freight and sounding fantastic.



Conclusion

It is appropriate that some idea of what the costs would be to do just one of these locomotives be provided. The cost of detail parts has increased dramatically since this project started. Rather than provide a detailed breakdown for the individual parts, it was felt a general cost for the various sub-assemblies would be better. This would allow the modeler to decide just how much he or she wanted to invest to achieve a similar goal.

Re-building the drive train as discussed would be approximately \$50 to \$75. Re-detailing the engine and tender would be approximately \$150 to \$175. The sound system would be approximately \$135 to \$155. Overall costs to perform the work on one

engine would be estimated to be between \$325 and \$425.

This turned out to be a long but enjoyable project, though it is recognized not many B&O modelers would want to re-detail three locomotives at one time. However, if you have one of the Akane EM-1 2-8-8-4's, and feel you have good modeling skills, my suggestion is to go ahead and pursue re-detailing your engine. By taking your time and working in sub-assemblies the overall project will not seem overwhelming. When you are finished, you will have a locomotive that looks great, runs exceptionally well and one which you can be proud to display and operate.

Table 1. Brass models of the B&O EM-1 available over time from various brass importers.

BRASS HO SCALE MODELS BALTIMORE AND OHIO RAILROAD EM-1					
<u>YEAR</u> <u>IMPORTED</u>	<u>IMPORTER</u>	<u>BUILDER</u>	<u>COUNTRY</u> <u>OF ORIGIN</u>	<u>CATALOG</u> <u>NUMBER</u>	<u>NOTES</u>
1959	Akane	Akane	Japan	800F	Not sprung, flat bottom on boiler, open frame motor, and unpainted.
1959	Aristo	Akane	Japan		Not sprung, flat bottom on boiler, open frame motor, and unpainted.
1959	International	Akane	Japan		Not sprung, flat bottom on boiler, open frame motor, and unpainted.
1961	Takara	Akane	Japan		For Blum's 1961 sale.
1962	Gem	Akane	Japan	IM-108	Not sprung.
1963	Gem	Akane	Japan	800	
1979	Westside Model Co	Samhongs	Korea		Dual can motors and unpainted.
1983	Key Imports	Samhongs	Korea		Prototype modeled #7600 unpainted.
1983	Key Imports	Samhongs	Korea		Prototype modeled #7620 unpainted.
1994	Precision Scale Co	Samhongs	Korea	16718	Crown Series as delivered without overfire jets no paint.
1994	Precision Scale Co	Samhongs	Korea	16718-1	Crown Series as delivered without overfire jets factory painted #7600-#7609.
1994	Precision Scale Co	Samhongs	Korea	16720	Crown Series intermediate version with overfire jets no paint.
1994	Precision Scale Co	Samhongs	Korea	16720-1	Crown Series intermediate version with overfire jets factory painted #7610-#7618.
1994	Precision Scale Co	Samhongs	Korea	16722	Crown Series late version rebuild no paint.
1994	Precision Scale Co	Samhongs	Korea	16722-1	Crown Series late version rebuild factory painted #7619-#7624.
1999	Challenger Imports Limited	Samhongs	Korea	2294.1	Prototype modeled #7614 from the second group built, factory painted.
1999	Challenger Imports Limited	Samhongs	Korea	2295.1	Prototype modeled #7629 from the second group built, factory painted.
1999	Challenger Imports Limited	Samhongs	Korea	2295.2	Prototype modeled #679, former #7629, factory painted.
1999	Challenger Imports Limited	Samhongs	Korea	2311.1	Prototype modeled #7609 from the first group built, factory painted.

The Brown Book, The Complete Guide to Buying and Selling HO Brass Locomotives by R A Brown
2nd Edition, 1982, Darwin Publications, Burbank, CA

The Brown Book of Brass Locomotives by John Glaab
3rd Edition, 1994, Chilton Book Company, Radnor, PA

Dealer Pick-up Notices, Precision Scale Company, Inc. Stevensville, MT

Dealer Pick-up Notices, Challenger Imports Limited, Des Moines, IA

Compiled by Raymond Stern
Milton, DE
December 7, 2008

Materials

Precision Scale Parts

- 3110 Re-Rail frogs 2.5 x 9mm – 2 pieces
- 3146 Generator, Pyle National MD-6 Turbo
- 3163 Pump, Worthington hot water SA-6 reciprocating (ALT)
- 3164 Heater, Worthington SA feedwater, type 1 (ALT)
- 3165 Pump, Worthington centrifugal cold water (ALT)

- 3382 Lubricators Nathan DV-4 (ALT.)
- 3415 Distributing Brake Valve, distributing Westinghouse 8-ET
- 31824 Whistle w/up lever, modern 5 chime side mount
- 32339 Steam blower, smokebox mount w/valve handles
- 39002 ** Brake Cylinders modern EMD for tender trucks
- 31635 Power reverse left hand for articulates (ALT)
- ** Used if replacement tender trucks are missing brake cylinders

Cal-Scale Parts

- 190-205 Headlight Pyle National w/angle number boards
- 190-211 Generator, turbo (ALT.)
- 190-244 B&O Capital Dome
- 190-253 Boiler check valve w/stop valve
- 190-262 Nathan Non-lifting injector
- 190-270 Worthington Type SA Feedwater Heater System 3 piece set (ALT)
- 190-271 Nathan mechanical lubricators w/brackets (ALT)
- 190-277 Standard air hoses for tender
- 190-280 Modern Era Loco & tender marker lights (ALT.)
- 190-285 Bell, air ringer
- 190-297 Power Reverse left hand for Articulates (ALT)
- 190-304 Headlight, Pyle backup (Use on tender)
- 190-312 Standard Era USRA Loco marker lights (ALT)
- 190-320 Air and signal hoses, bracketed

NWSL Parts

- 488-6 "U" Joints for 2.0mm, 2.4mm shafts
- 2020-4 2.0mm shafting
- 2024-4 2.4mm shafting
- Metric screws various sizes – replacement as necessary

MV Lenses

- L173 Headlight
- L149 Backup light

Miniatronics Corp

- 18-016 Incandescent lamps 16V, 30ma, 2.4mm
- 18-014 Incandescent lamps 14V, 30ma, 2.4mm
- 50-001-02 Connector, 2 pin micro-mini
- 50-003-01 Connector, 3 pin micro-mini

Soundtraxx

- TSU-1000 Tsunami Heavy Steam Decoder, also available in Micro version.
- SXX810078 28mm x 40mm Oval speaker 8 ohm, 1 watt

K&S Structural Shapes

- 183 3/16" Angle stock
- 185 1/4" Angle stock
- 243 .032 x 3/4 inch, Flat brass stock width to match frame width
- Brass wire – various sizes
- Alternate for wire would be Detail Associates

Miscellaneous Parts

- Falhaber coreless motor, 22mm x 32mm
- Circuitron 8703 heat shrink tubing - .064" diameter

Classification Lights (markers) Jewels

Bowser .050 diameter – All colors, or

Finishes by Bob Rzase – 1mm jewels – All colors

***** Replacement tender trucks, Extra parts from Westside's Model of the EM-1, May no longer be available.

AHD Speaker 28mm x 40mm Oval speaker 8 ohm, 1 watt (ALT)

AHD Speaker Enclosure, for 28mm x 40mm speaker

OPTIONAL ADDITIONAL PARTS that could be installed

Precision Scale Parts – 48202 – Cleanout/Washout Plugs for Boiler

Cal-Scale 190-268 Front End Throttle Casting

Cal-Scale 190-306 Westinghouse “U” Tender Brake Set – Std. Era 1920 to 1950

Cal-Scale 190-239 Overfire Jets (If engine is to be modeled in a different time period)

References

Mainline Modeler - Jan-Feb 1981 issue, article by William Barringer on B&O EM-1, 2-8-8-4's

Railfan - Winter 1976, “The EM-1 out of Benwood”

B&O - “Thunder in the Alleghenies by Deane Mellander”

Baltimore and Ohio Railroad in the Potomac Valley by Martin J. McGuirk

Baltimore & Ohio's Magnificent Articulated 2-8-8-4 EM-1 Locomotive by Thomas W. Dixon, Jr. and Bob Withers

Miscellaneous photographs from John Holt, Sr. collection

Miscellaneous photographs from William Barringer collection



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